

AN

## EXPERIMENTAL INQUIRY

INTO

THE PROPERTIES OF

O P I U M,

AND ITS

E F F E C T S

ON

L I V I N G S U B J E C T S:

WITH OBSERVATIONS ON ITS

HISTORY, PREPARATIONS and Uses.

BEING THE

DISPUTATION which gained the HARVEIAN PRIZE  
for the Year 1785.

BY JOHN LEIGH, M.D.

v

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Quæ priores nondum comperta, eloquentiâ percoluere, rerum fide  
tradentur. TACITUS.

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M,DCC,LXXXVI.



THIS TREATISE IS HUMBL Y INSCRIBED

TO

GEORGE WASHINGTON, Esq.

A MAN EQUALLY REVERED

BY THE FRIENDS AND FOES OF HIS COUNTRY;

AND WHOSE CHARACTER WILL,

WITH UNRIVALLED LUSTRE,

BE TRANSMITTED TO THE

LATEST AGES OF POSTERITY,

FOR CONSUMMATE CONDUCT AND COURAGE,

PUBLIC AND PRIVATE VIRTUE.

EDINBURGH, }  
May 15. 1786. }



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## INTRODUCTION.

**T**HE difficulties which every young author must encounter when he solicits, for the first time, the attention of the public, are sufficient to damp the ardour even of the most active genius; and must of necessity appear doubly formidable to the man who is diffident of him-

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self.

self. Criticism lies in wait for the discovery of error; Satire prepares its shafts; the merits of the work, if it can boast of any merit, are frequently overlooked, and its defects sedulously held forth to the eyes of the world. Such is generally the fate of a first production, when it is brought forward to public view recommended by no authority, and supported by no sanction which may command respect.

THE author of the present Treatise is not so vain as to imagine that he possesses any thing in himself which is capable of shielding him from these attacks. And had he nothing to support him but his own authority, he never would have ventured to appear before the awful tribunal of the public. But he has the happiness to find, that he possesses something more solid to depend upon than this frail support. His Treatise has obtained the patronage

tronage of the *Harveian Society*; the members of which have repeatedly distinguished themselves by their eminent abilities. The approbation of this respectable society has encouraged him to give to the world what otherwise his diffidence would have led him to with-hold; and he flatters himself, that his Treatise will be received with that candour and indulgence to which a first performance has a peculiar claim. Having thus made his apology, he shall detain the reader no longer than while he describes the method by which he has conducted himself in this work. As this Treatise was originally written in the form of a dissertation for the *Harveian Society*, (to which many additions will now be made), it was incumbent upon the author to adopt that method which a long established custom had rendered common. For this reason the work will be introduced by a short history of opium.



UPON this subject very few original observations can be expected; the only demand that can be made on the author is, to collect and arrange with accuracy those opinions which are best established, and which convey the greatest degree of information. As the author's endeavours to effect this have been exerted to the utmost, he hopes they will not be found to have been altogether fruitless.

LINNÆUS has placed the *Papaver* among his *Polyandria Monogynia*, and describes several species; but his *Papaver Somniferum* seems to be generally considered as that from which the opium is prepared.

THESE plants grow in great plenty in the fields and gardens of Persia, Egypt, and other provinces of Asia; they have not hitherto been much cultivated in Europe.



rope, though they are often found in gardens.

BOTANICAL writers have described this plant in the following manner: “ It has  
“ oblong slightly indented leaves and  
“ roundish stalks, divided into a few  
“ branches, each of which is terminated  
“ by a large tetrapetalous flower of a  
“ whitish appearance, set in a two-leaved  
“ cup that falls off as the flower opens ;  
“ the flower itself likewise soon falls, leaving a smooth roundish head or capsule,  
“ covered with a radiated crown, and containing a number of smooth roundish  
“ white seeds: It is annual, and flowers  
“ from June to near the end of summer.”

IN Chardin's Travels (an author of the greatest accuracy and most extensive observation) we find the following descrip-

“ This plant is four feet high; its leaves  
“ very white: it is ripe in the month of  
“ June; about which time the juice is ex-  
“ tracted from the heads.”

IN Raynal's History of the East Indies,,  
a different description is given of this  
plant. This author says, “ That this plant  
“ has oblong and sinuate leaves of a sea-  
“ green colour, alternately disposed upon  
“ a smooth stem with very few branches,  
“ and three feet high. Each branch is al-  
“ most naked, terminating by a single  
“ flower, rather large, composed of a calix  
“ with two leaves, four white or rose-  
“ coloured petals, and a great number of  
“ stamina placed under the pistil, which  
“ they surround. The pistil grows into a  
“ large round seed-vessel, ornamented with  
“ a radiated crown, and filled with a pro-  
“ digious number of round, white, and  
“ oily seeds.”

It is not wonderful that, at a period when truth and reason were obscured by superstition, and when investigation was smothered by ignorance, even the history of a remedy so generally used as opium should have produced many disputes: Thus, in the works of the more ancient writers, we find that this subject gave rise to a contest in which many were engaged.

THE species of poppy from which the opium was prepared, appears first to have opened this field of contention; and on this point great names have contended against each other. Pliny, who appears to be an author of great information, asserts with much confidence, that opium is procured principally from the *Papaver Nigrum*. Dalecampus also supports this opinion with all the warmth natural to a mind conscious of the truth of its asser-

tions; but Garcias and Kempfer, who were both in Egypt, question the validity of these opinions, and attempt to overthrow them, by telling us, that they had frequently witnessed the operation for extracting the opium, and that the white poppy alone was used. Disputes of this nature might be useful and amusing in an age when discoveries first began to dawn upon mankind; but at present they would be fruitless, as very recent experiments prove, that the opium prepared either from the black or white poppy is equally good. As, however, the white poppy has by much the largest head, and is found to afford the greatest quantity of juice, there can be little doubt that the makers of opium will prefer this.

THE next subject that engaged the attention of the ancients, was by far the most important and interesting: this respected



spected the manner of preparing opium. We shall here find, that authors of great and established repute have entered the lists, and encountered each other with so much warmth, that an appeal to their works will only add to the confusion. Lermery, Alpinus, Savary, and others, have made many attempts to prove that the opium of our shops is nothing more than the Meconium of the Egyptians, which they prepared from the heads and leaves of poppies. This opinion has received additional force from the observations of Mr Condamine, who expresses himself in the following words: “ I am assured by those  
“ who are well informed, that the opium  
“ of the shops is all an extract of the de-  
“ coction of the poppies.” Beleonius also, who travelled for the space of two years in Egypt, mentions many circumstances in support of the opinion of Condamine; but when we examine the works of those who  
wrote

wrote about the same time, and others who followed, there will appear many arguments sufficiently strong to shake, if not to overthrow, the opinions just now mentioned. Garcias, Mandeflo, Tavernier, Kempfer, and others of equal eminence, have investigated this point with the greatest candour; and from their determinations we are led to conclude, that the opium of our shops, as well as that of the Egyptians, was procured only from the juice of the poppy-heads by incision. In this undetermined state the dispute remained, when there appeared one \*, who, more attached to facts than speculations, entered willingly into the field of experiment, and after much labour elucidated and firmly established the truth. To this adventurer are we then indebted for the discovery which

\* Dr Alston.



which proves that opium is the juice of the poppy procured by incision alone.

WE are told, that in the province of Bahar in the East Indies, the poppy-seeds are sown in the months of October and November, at about eight inches distance, and well watered till the plants are about half a foot high, when a compost of dung, nitrous earth, and ashes, is spread over the areas; and a little before the flowers appear, they are again watered profusely till the capsules are half grown, at which time the opium is collected; for when fully ripe, they yield but little juice: two longitudinal incisions from below upwards, without penetrating the cavity, are made at sun-set for three or four successive evenings; in the morning the juice is scraped off with an iron scoop, and worked in an iron pot in the sun's heat till it is of a consistence to be formed into thick cakes

cakes of about four pounds weight ; these are covered over with the leaves of poppy, tobacco, or some other vegetable, to prevent their sticking together, and in this situation they are dried.

CHARDIN has given us the following account : “ The poppy is ripe in the month  
“ of June, at which time they extract the  
“ juice from it; they slice it in the head; and  
“ the Persians, by way of superstition, make  
“ twelve slices in memory of the twelve  
“ imans, three incisions one by another all  
“ at the same time, with a little brill that  
“ has three edges like the teeth of a comb ;  
“ there comes out a thick viscous juice,  
“ which they collect at the dawn of day.”

IN Raynal's History of the East Indies we find these observations : “ When the  
“ poppy is full of sap, and that the head of  
“ it begins to swell, one or more incisions

“ are made into it; from whence distil  
“ some drops of the milky liquor contain-  
“ ed within, which is left to congeal, and  
“ is afterwards gathered. This operation  
“ is repeated three times, but the produce  
“ gradually diminishes in quantity, nor is  
“ it of so good a quality. When the opi-  
“ um is gathered, it is moistened and  
“ kneaded with water or honey till it ac-  
“ quires the consistence, viscosity, and  
“ glossiness of pitch, when it is well prepa-  
“ red, and is then made into cakes. That  
“ kind is most in esteem which is rather  
“ soft and yields to the touch, is inflamma-  
“ ble, of a blackish brown colour, and has  
“ a strong fetid smell; on the contrary,  
“ that which is dry, friable, burnt, and  
“ mixed with earth and sand, is to be  
“ thrown away.”

THE opium prepared about Thebes,  
hence called the *Thebaic opium*, has been

generally esteemed the most pure; but Condamine disputes the propriety of this common opinion. Thus, when mentioning “that the greatest part of the opium  
“fold at Constantinople is brought from  
“Natolia, he observes, that it grows in  
“great plenty in the territory of Thebes  
“in Egypt; but even there the Natolian is  
“preferred, and sells for double the price  
“of that made in the country.” Chardin expresses himself in the following words on this subject: “The best *apoum*, as call-  
“ed by the ancients, hence our term *opi-*  
“*um*, is made in the canton of Lingar,  
“six leagues from Ispahan, where the  
“fields are covered with poppies: There  
“are some who hold the opium of Caze-  
“ron in still greater esteem than that at  
“Ispahan; saying, that the opium of the  
“latter produces crudities in the stomach,  
“while the other does not.” Though distinctions of this kind can afford no real



utility at the present day, still it is the duty of an author to correct, as far as information admits, every fallacious opinion which may have prevailed.

No writer has yet offered to the world any satisfactory account of the manner in which this valuable remedy, or its virtues, were first discovered; hence the imaginations of many have been busily set to work, and a variety of fruitless conjectures brought forth to fill up this historical chasm. Some say that it was first discovered by a Grecian, who, being compelled one night to take shelter under a tree where a number of poppies grew, found himself so disposed to sleep as not to be able to rise in the morning. Others attempt to prove that it was discovered by an Egyptian, who, labouring under some complaint, was advised to have recourse to the use of vegetables in form of decoction; that

that by chance the poppy was used, and thus its effects became known.

It is not strange, that at this period of darkness even these fanciful conjectures should have given rise to a permanent dispute; and hence we find that this alone was the cause of a contest, in support of which many volumes have been written. Some, anxious to bestow on the Egyptians the merit of this important discovery, and having no just grounds to support their reasons, have brought forth a variety of arguments, which are either taken from the works of poets (as Homer\* and others), or which owe their birth to fancy.

THOUGH

\* It is certain that Homer describes, in the fourth Book of the *Odyſſey*, a drug which appears to possess all the qualities of opium, and which *Helen* is said to have received from the wife of Thone the Egyptian. The Poet also describes Egypt, in the same passage, as abounding at that period in skilful physicians. But from this we can hardly infer any regular use of opium as a medicine:



THOUGH it may be difficult to advance an opinion on this subject founded on truth and certainty, still there are some circumstances which will enable us to form a plausible conjecture. As Hippocrates was the first who recommended opium to be used internally, it is highly probable that its properties were discovered about that time and in his country. This conjecture receives additional strength from the opinion of Diagoras, who lived about the same time with Hippocrates. This physician is said to have forbid the use of this remedy, because it dimmed the sight, and produced a great disposition to sleep. From these circumstances it is reasonable to conclude, that at this period the virtues of opium must have made their first appearance. Soon after this, attempts were made to investigate the properties of this remedy, and its effects on living subjects. Things seem to have run the same

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course in the East. Thus Chardin informs us how opium first began to be applied in Persia for the cure of diseases. "There was," says he, "a superior of Isfahan, called Father Angé of St Joseph, a man skilled in medicine, who, anxious to understand the effects of opium, took a pill of it, and then made its operation known to the world."

NOTWITHSTANDING these very important discoveries, some considerable time elapsed before opium was freely used; and it is said that Heraclides of Tarentum was the first who established its reputation. And now the happy moment arrived when the benefits of so valuable a remedy were no longer to remain confined by the fetters of ignorance, but, like the light of day, to be diffused throughout the different parts of the world; and thus have they received those just encomiums so liberally be-

bestowed by many Arabian \*, German †, and English ‡ writers. And thus far of the history of opium. We now proceed to the second branch of our subject, which is to describe its sensible qualities.

OPIUM (the inspissated juice of the poppy) is of a solid consistence; yet somewhat softish and tenacious, of a peculiar faintish disagreeable smell; to the taste it is at first nauseous and bitter, but soon becomes acrid and warm. In the mass it is of a dark reddish brown colour, and when reduced into powder yellow; it is said to possess a gum-resin, an essential oil, a salt and earthy matter. To ascertain the truth of this opinion the following experiments were made; but before these are related, it seems proper to observe,

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that

\* Rhases, Avicenna, and Avenzoar.

† Sennertus, Wedelius, and Ludovicus.

‡ Sydenham, and many others.

that as it was my duty to analyse the component parts of opium with the greatest accuracy, it became necessary to institute a number of experiments; which are better calculated, perhaps, to effect that end, than to afford entertainment to the reader.

EXPE-

# EXPERIMENTS

O N

O P I U M.

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## FIRST CLASS.

### EXPERIMENT I.

**T**O one ounce of the common crude opium of the shops I. added a quantity of distilled water; the opium was then suffered to macerate for three days, during which time it was very often agitated:

C 3

fresh



fresh water was added, and the agitation continued so long as the opium communicated any colour to the water.

### EXPER. II.

THE whole of the above solution was now filtered; and that which passed thro' the paper, which I supposed to be the gummy part, was evaporated by a very gentle heat down to the consistence of an extract: this was put into a cool place; and when perfectly dry, weighed: the quantity was found to answer to the following Table of the different proportions:

### EXPER. III.

To that part of the opium which remained after the filtration of Exper. II. and which could not be acted upon by water, I added a quantity of alcohol, and  
ful



suffered it to macerate two days, during which it was repeatedly agitated in the vessel; the liquor was then gently poured off, fresh alcohol added, and the whole rubbed in a mortar so long as the alcohol had any action on the opium: it was then filtered.

#### EXPER. IV.

THE solution which passed through the filtering paper, and which I supposed to be the resinous part of the opium, as it had been taken up by the alcohol, was evaporated by a very gentle heat down to the consistence of an extract, which was made dry and weighed.

#### EXPER. V.

AFTER the filter of Exper. III. there remained a considerable residuum, which

I have taken the liberty to call Feculent Matter, because it was found, as will be hereafter proved, to possess no sensible properties: this matter was made dry by a gentle heat; which, with the other different parts, was as follows:

Different parts of opium, and the quantities of each, answering to the first Class of Experiments.

Quantity of resin ʒi & ʒi.

Gum ʒiij & grs. 50.

Feculent matter ʒi. grs. 6.

The reasons which induced me to institute these experiments must appear obvious; my design was to separate the gummy and resinous parts of the opium from each other: with this view I was led to use distilled water, which is well known to be the best solvent for gums. The same reasons would naturally lead me, after dissolving the gum, to make use of a menstruum which might act upon  
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the resin; for this purpose I had recourse to alcohol, which is found to be the most powerful solvent for all resinous matter. Though these different menstrua act upon the gum and resin perfectly when in a pure and separate state, I yet doubted whether these experiments alone would answer my purpose fully, as it appeared very probable that the gum, when intimately combined with the resin, might render the latter partially soluble in water; and thus also with respect to the solubility of the gum by alcohol when intimately combined with the resin. For these reasons I thought it dangerous to confide too implicitly in one set of experiments, and that it would be more advisable to introduce others, by which I should avoid every difficulty, and also remove my own doubts. With this view I instituted the following, which I hope have fully answered my expectations. It seems proper to observe  
here,

here, that wherever in my experiments I have mentioned opium simply, without any other distinction, I mean the common crude opium of the shops.

As the following experiments were instituted with the same view and for the same reasons as the preceding (viz. to separate the different parts of opium), it will be unnecessary to make any further observations respecting each of them: The reasons which induced me to take the liberty of using the term Feculent Matter, mentioned in Exper.V. will be more particularly explained when I come to examine the different parts of opium.

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## SECOND CLASS.

### EXPER. VI.

ONE ounce of opium was cut into very small pieces, a quantity of alcohol was added, and it macerated three days, during which it was repeatedly agitated; the liquor was then gently poured off, fresh added, and the agitation continued so long as the opium communicated to it any colour: I then filtered the whole; and the solution which passed the filter was evaporated by a very gentle heat down to the consistence of an extract, which was then dried and prepared in the same manner as in preceding experiments.

### EXPER. VII.

To the opium which remained after this filtration, and which I supposed to be the  
gummy



gummy part, I added a quantity of distilled water, and agitated it in a mortar with a pestle; fresh water was added, and the agitation continued as long as any colour was communicated to the water; the whole solution was now filtered, and that which passed through the paper evaporated by a very gentle heat down to the consistence of an extract, which was dried and weighed: the quantity is mentioned in the following table.

#### E X P E R. VIII.

AFTER this filtration, there remained a considerable residuum, to which I have already given the name of Feculent Matter; this was dried, weighed, and found with the other different parts of the opium as follows.

Different parts of opium, and quantity  
of



of each, answering to Second Class of Experiments.

Quantity of resin	3i. and ʒi
Gum	ʒiij. and grs 6
Fec. matter,	3i. and grs 10

THIRD

## THIRD CLASS.

### EXPER. IX.

I ADDED to one ounce of opium lb. ij. of distilled water; then put the whole into an open vessel, and applied to it one hundred degrees of heat by thermometer: It remained in this situation twenty-four hours, was then put by till cool, when I filtered it.

### EXPER. X.

THE solution which passed through the filtering paper was now evaporated by a  
very

very gentle heat down to the consistence of an extract, then dried, and its quantity ascertained.

### EXPER. XI.

To the opium which remained on the filter of Exper. IX. I added a quantity of alcohol, and rubbed it in a mortar for a considerable time; fresh alcohol was added, and the rubbing continued so long as any colour was communicated by the opium; the whole was then filtered, and the solution evaporated and prepared in the same manner as mentioned in last Experiment.

### EXPER. XII.

THERE remained after this filtration a considerable quantity of what I have  
4 called

- called Feculent Matter: this was dried, weighed, and found as follows.

Table of Third Class of Experiments.

Quantity of resin	3i. and grs 15
Gum	3iij. and grs 30
Fec. matter,	3i. and grs 15

FOURTH

## FOURTH CLASS.

### EXPER. XIII.

AFTER cutting one ounce of opium into very small pieces, I added to it a quantity of distilled water, and rubbed it in a mortar for some considerable time; the water was then gently poured off, and fresh added; agitation with the pestle was also continued; this was repeated so long as the opium gave any colour to the water: the solution was then filtered, and evaporated by a gentle heat down to the consistence of a thick syrup.

### EXPER. XIV.

To this syrupy consistence I added a

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considerable quantity of alcohol, and suffered it to stand several hours; the alcohol was then gently poured off.

This method was adopted, because I apprehended that the distilled water had taken up some of the resinous part of the opium with the gum. By the addition of alcohol in a very considerable quantity, I was certain that any part of the resin which might be contained in this syrupy consistence with the gum would be taken up instantly, and the gum left pure at the bottom. When I examined the alcohol which was poured off, it was found to contain some resin, the quantity of which was afterwards ascertained by the process of evaporation.

This proves evidently, that although resin, when in a pure and separate state, is insoluble in water; yet when intimately  
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combined with gummy matter, is rendered partially soluble by that menstruum.

### EXPER. XV.

To the opium which remained insoluble in water after the filtration of Experiment XIII. I added a quantity of alcohol, and then rubbed the whole for a considerable time in a mortar: this was poured off, fresh alcohol added, and the agitation continued so long as the alcohol received any colour from the opium.—The whole was then filtered, and evaporated by a gentle heat down to the consistence of a thick syrup.

### EXPER. XVI.

To this syrupy consistence I added a very considerable quantity of distilled water; it was then suffered to stand se-

veral hours, when the water was poured off. The extract which remained at the bottom of the vessel was made dry and weighed.

This method was adopted with views similar to those of Exper. XIV. Finding that the resin had been rendered partially soluble in water by means of the gum with which it was combined, I was naturally led to suspect that the same would take place with the gum when intimately combined with the resin: in this conjecture I was by no means deceived; for by examining the water which I had poured off from the resinous matter, it was found to have taken up a considerable quantity of gum which had been acted upon by the alcohol.

This must prove incontestably, that both gummy and resinous matters, when intimately combined, render each other capable

ble of being acted upon by menstrea, which have no effect upon them when in a pure and separate state.

## E X P E R. XVII.

AFTER the filtration of Exper. XV. there remained a quantity of feculent matter: This was made dry; and its quantity with the other different parts of the opium found to be as follows.

Table answering to Fourth Class of Experiments.

Quantity of resin,	3i. and ʒi.
Gum,	ʒiv. and grs. 20.
Fec. matter,	3i. ———

The whole of these experiments were frequently repeated; but I must confess that they did not exactly agree: the last

class seems to merit the greatest attention ; for though, when repeated, they did not perfectly correspond with the first, yet I found in them the least variation. Upon examining the different quantities found in the several classes of experiments, it is clear a loss has been sustained in some of them ; but it must be observed, that tho' it is impossible to avoid some loss in experiments of this nature, still we shall find it less on the present occasion than appears at first view. The opium which I used in these experiments had never received any heat, which I found by trial would free it, even applied in a moderate degree, of a very considerable part of its moisture, and consequently lessen its weight. One ounce of the common opium of the shops will, by exposure to a moderate heat, be deprived of one drachm of its weight.

The reasons which led me to use the  
pro-



process of evaporation must appear evident, as this was the only secure method by which I could reduce the different solutions to a solid state, and so ascertain their different quantities.

As I intended to make some experiments upon the different parts of the opium when they were perfectly separated, I avoided applying such a degree of heat as might have deprived them of any of their active properties. Having thus fully accomplished my views, by procuring in a separate state these different parts, I proceeded to examine each separately, as will appear from the following experiments.

#### EXPER. XVIII.

TO a small quantity of the resinous part of opium, procured by the Fourth Class of Experiments, after being dissol-

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ved



ved in alcohol, I added a small quantity of chalybeate water; it immediately struck a deep black colour, which increased considerably by standing two days. It may be proper here to observe, that whenever I made use of my chalybeate water, it was ever of the same strength, viz. ten grains of sal mart. to one ounce of common distilled water.

#### EXPER. XIX.

TO the same quantity of pure gum as of resin used in last experiment, when dissolved, I added the same quantity of my chalybeate; it struck a black colour, which increased by standing two days, but did not equal that produced in the resinous solution. This must lead us to suppose, that the principle of astringency rests in the resinous part of the opium in a greater degree than in the gum; still it is evident

dent from this experiment, that the gum also possesses something of the same principle.

## E X P E R. XX.

TO a quantity of the feculent matter I added alcohol, and then rubbed it in a mortar for some considerable time; but no colour was communicated to the alcohol, nor had it any effect whatever on the feculent matter. To more of this matter was then added a quantity of distilled water, with which it was rubbed in a mortar some considerable time, but no colour was communicated to the water; the water was then poured off, the matter dried, and found to have lost nothing in weight.

## E X P E R.

## E X P E R. XXI.

I THEN added to a quantity of this feculent matter boiling water, and suffered it to stand several hours; no change whatever took place in the matter: By the addition of the boiling water a small quantity of earthy matter was set at liberty, which fell to the bottom of the vessel. When applied to the organs of taste and smell, this feculent matter communicated no sensible properties whatever. These experiments prove, that little dependence should be placed in the common crude opium of the shops, as it contains more than one-eighth part of inactive matter: They also point out the necessity of adopting some mode by which the opium of the shops may be freed from its impurities. For this purpose the London Dispensatory has recommended the method  
of

of straining the opium; but even this will not answer the end effectually, as will appear from the following experiments.

## E X P E R. XXII.

HAVING procured two drachms of the purest strained opium of the shops, I added to it the same proportion of proof spirits and water as ordered by the Pharmacopœia for making Tinct. Theb. It was then suffered to stand near a stove, where the temperature was ninety-five degrees by thermometer, for three days; during which it was repeatedly agitated: It was then filtered, the residuum dried, and found to amount to ten grains in weight.

## E X P E R. XXIII.

TO this residuum or feculent matter of  
the



the strained opium I added the different menstrua used in Exper. XX. and XXI. but it was found insoluble in either: When applied to the organs of taste or smell, it communicated no sensible activity.

From these circumstances it appears very evident, that straining the opium does not purify it sufficiently: For, independent of the inactive matter which is found to remain in the opium after being strained, it is reasonable to suppose that the great degree of heat made use of in this process cannot fail to diminish its active properties considerably. The effects of heat on opium will, however, be pointed out more fully in a succeeding part of this work. Anxious to know the strength of strained opium, I gave a man in perfect health three grains of it, and remained with him till the operation was over:



Three days after, I gave the same man two grains of pure gum and resin intimately combined, and found that the effects of the last dose were considerably greater than the first.

The result of these experiments points out the propriety of searching for some other means, by which we may not only free the opium of its impurities, but at the same time avoid doing any injury to its active properties. For this purpose the following method seems most eligible :

To one ounce of the common opium of the shops add six ounces of spirit of wine diluted with as much water ; let them digest in a gentle heat for four days, during which they should be frequently agitated ; then filter the whole, and evaporate the tincture by a very gentle heat down to the consistence of an extract. By this method

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we shall get the opium in a pure state. The menstruum here recommended, is known to act powerfully both on the gum and resin, which will be intimately combined by the process of evaporation; and by filtering the tincture through paper we shall free it perfectly of the feculent matter. When we have opium in this pure state, the physician, who is acquainted with its operation, will be enabled to form, as to its effects, a true opinion, and will also have some prospect of certainty in the dose which he may administer.

## E X P E R. XXIV.

TO one ounce of opium, cut into small pieces, I added lb. ij. of distilled water; the whole was rubbed in a mortar till the opium was dissolved. I then put the solution into an alembic, applied a brisk heat and drew off about half a pound of the

water. As this experiment was instituted with a view to procure the essential oil of the opium, a brisk heat was necessary. To the taste this water was extremely pungent, and left a disagreeable nausea: To the smell it was strongly narcotic. To a quantity of this water some of my chalybeate was added, but no change whatever was produced in its colour. I examined some of this water with a magnifying glass, but could not discover distinctly any globules of oil. I was then led to make such experiments as would enable me to separate the particles of oil (if it contained any) from the water, so as to make them visible. It will be unnecessary to mention all the methods adopted for this purpose, as I was disappointed in many of them; shall therefore only relate such as succeeded.

EXPER.

## EXPER. XXV.

TO a small quantity of this water, drawn off from the opium by distillation, was added a sufficiency of soluble tartar to saturate it; after standing twenty-four hours, I examined it with a magnifying-glass, and discovered evidently small globules of oil floating on the top of the water. To the taste these were extremely pungent, attended with a peculiar sensation, which is common to opium alone. I was induced to adopt this method for the following reasons. Supposing that the water which I had drawn off, from its smell and taste, possessed a quantity of oil, the particles of which might be so intimately combined with it as to render them invisible, I thought it necessary to add such a body as might unite with the water and set the oil at liberty: It is well known that wa-  
ter



ter and soluble tartar have a great affinity; and thus we find, that as soon as the water was saturated the oil rose to the top. It may be proper here to observe, that neither alcohol nor pure alkali would have answered this purpose; because they have an attraction for oil as well as water.

This experiment clearly proves, that the conjectures which many writers upon opium have advanced respecting its essential oil were better founded than they supposed. Supposing, from the strong smell and taste of this water, that it contained most of the active properties of opium, I was anxious to know its effects upon the living subject. With some difficulty I prevailed on a healthy man to take fifteen drops of it; in a short space of time it began to operate, and brought on such a vomiting as deterred me from making any further experiments of this nature.

E

EXPER.



## E X P E R. XXVI.

WITH the opium from which this water was drawn, I now performed the same experiments as used the in Fourth Class, and with the same views, viz. to separate the different parts: When this was accomplished, the following experiments were made.

## E X P E R. XXVII.

TO a small quantity of the resin, when dissolved in alcohol, I added some of my chalybeate water; after standing some time, a faint blackish colour appeared, but by no means so great as found by the trial made upon the resin when separated without the application of heat \*. From this we may very reasonably conclude, that the  
astrin-

\* Vid. Exper. XVIII.

astringent principle rests in the essential oil; for Exper. XVIII. proves indubitably, that the resin, before the application of heat, possessed a very considerable degree of astringency, which we now find it is deprived off; I suppose in consequence of the essential oil being extracted.

I gave three grains of this resin dissolved in alcohol to a young girl in perfect health, who had never been accustomed to the use of opium, and remained with her near two hours to examine its operation, but it produced no sensible effects. I then repeated the same experiment upon a young man in perfect health, but could never discover the smallest effects from the dose; nor did either of the patients complain of any unusual feelings. This would seem to prove, that most of the active properties of the opium are contained in its essential

oil; and that the resin, when deprived of this, has little or no action on the system.

### EXPER. XXVIII.

HAVING dissolved a quantity of the gum in water which was separated from the resin, as mentioned in Exper. XXVI. I added to it a small quantity of my chalybeate; a black colour was immediately produced, as great as that nearly which appeared in Exper. XIX. This gum was extremely bitter to the taste, but had nothing of an odorous smell. It seems rather difficult to account for the principle of astringency in the gum; perhaps it may have the power, notwithstanding the application of heat, to retain a certain quantity of the essential oil, in which it is probable its astringency, as well as that of the resin, may reside.

I gave a girl, fifteen years of age, four grains of this gum ; in about an hour she began to complain of a great degree of drowsiness, which continued to increase till she went to her bed, where she rested very well through the night. I visited her early the next morning, and found her in perfect health, nor had she felt any of those disagreeable symptoms which commonly follow so large a dose of opium. In about half an hour after the opium began to operate, her pulse fell twelve strokes in a minute. During the time of the operation she informed me, that she felt no other effects except a very great disposition to sleep.

To procure the salt said to be contained in opium was the object which now engaged me ; and as many experiments were instituted for this purpose which did not succeed, it will be sufficient to relate



those only by which I accomplished my views.

### EXPER. XXIX.

TO half an ounce of opium I added one ounce of nitrous acid diluted with the same quantity of distilled water; the whole was then put into a retort, and agitated for some considerable time; red fumes soon began to appear, and flew off in considerable quantity: as soon as the whole of these passed over, I applied the flame of a small lamp to the bottom of the retort for two hours; at the end of which time no air was discovered to fly off from the mixture: The whole was then poured into an open vessel, two ounces of distilled water added, and they were agitated some considerable time; after which the solution was filtered.

EXPER.



## E X P E R. XXX.

THE solution thus filtered was put into an open flat vessel, and evaporated by a very gentle heat down to about one half of its quantity ; it was then placed in a cool situation, where it remained two days: At the end of this time I examined it, and found a considerable number of crystals were formed at the bottom and sides of the vessel, of the same figure, colour, and taste, as those procured from sugar. These crystals were gently washed, dried, weighed, and found to amount to forty grains. I am induced, however, to believe, that if this experiment was repeated with accuracy, a much greater quantity of salt might be obtained : As it was the nature or property of this salt which I principally wished to investigate, little respect was paid to its quantity. It now remains

to assign the reasons which induced me to adopt this method. Having made a number of different experiments before, and finding myself baffled in the whole of them, I was led to believe that the opium contained some inflammable principle which, while it remained perfect, might prevent the salt from forming. This naturally caused me to use the nitrous acid; which, with the addition of heat, I supposed would effectually deprive it of such a property, if it possessed it. I still thought it necessary after this process to evaporate the mixture; by which I intended to free the solution perfectly of any part of the nitrous acid contained in it.

Desirous to know the effects which this salt would produce on the living subject, I gave to a man in perfect health ten grains dissolved in water, and remained with him two hours, but found it had no sensible operation.

These

These experiments must lead us to form one of the two following conjectures ; viz. That this saline matter is either originally contained in the opium, combined with the inflammable principle, which being destroyed suffers the salt to form ; or, that it is a new compound produced by some principle in the nitrous acid combining with some matter contained in the opium. Though it appears from the quantity of this salt which I gave to a man, and which had no effect, that it does not possess any of the active properties of the opium ; yet this will not give such strength to the latter conjecture as may at first be suspected ; for when we consider the nature of the process adopted to deprive the opium of its inflammable principle, it is just to conclude, that the same was sufficient to destroy its active properties, and consequently that the salt could not contain any of them. I am induced to believe  
also,

also, that by the process of evaporation the opium was freed wholly of the nitrous acid. These circumstances lead me to favour the first conjecture.

Supposing, from the similitude in appearance, taste, and colour between this salt and that produced from sugar, that their properties were nearly the same, the following experiments were instituted,

#### EXPER. XXXI.

I DISSOLVED, in a small quantity of rose water, equal parts of the acid salts of tartar, sugar, and opium separately; to each of these were added a few drops of Goulard's tincture, which they all precipitated; to each was then added a small quantity of distilled vinegar, which had no effect whatever: I next added a few drops of the nitrous acid, which immediately



diately redissolved the lead in all: so far these different acid salts agreed with each other.

## E X P E R. XXXII.

I THEN added to these three acid salts separately an equal quantity of lime-water: the acid salts of sugar and opium precipitated the lime, but the acid salt of tartar did not. This experiment was repeated several times, and found ever the same. From the result of this I am led to believe, that the acid salts of sugar and opium possess properties similar to each other: It is very evident that they differ very much from the acid salt of tartar; for when the lime-water was added, the acid salt of tartar did not precipitate it.

EXPER.



## E X P E R. XXXIII.

HAVING procured five phials of the same size, I put into each half an ounce of opium cut into very small pieces; and then added five ounces of different menstrea, viz. alcohol, white-wine, vinegar, rectified spirits and water equal parts, and common distilled water: they were then placed near a furnace, where the heat was about ninety-five degrees by thermometer: in this situation they remained for five days; during which they were carefully and repeatedly agitated; the solutions were then filtered separately, and the different residua dried and weighed: the quantity of each is expressed in the following table.

Water left undissolved	-	-	grs 199
Vinegar	-	-	128
Alcohol	-	-	100
White wine	-	-	90
Rectified spirits and water	-	-	88

These

These experiments were repeated, and found to differ from the first only in a few grains: hence we must conclude, that there is the greatest propriety in using the rectified spirits and water as the best menstruum for making our Theb. Tinct.

## E X P E R. XXXIV.

I MADE two ounces of opium into the consistence of a paste with common distilled water; the same quantity was also made with water impregnated with fixed air: they were placed in open vessels near a stove, where the heat was ninety degrees, by thermometer. In this situation they remained some considerable time before any change could be discovered in either: at length I found fermentation taking place in the one containing fixed air; some considerable time after this, a number of bubbles rose in the other, and a small quantity

tity of air ascaped: this air I endeavoured to collect by means of a bladder which was confined over the mouth of the vessel; but the quantity was so small as to render the attempt fruitless: the opium was now dried, and the following experiments made.

### E X P E R. XXXV.

A SMALL quantity of each of the fermented substances was separately dissolved in equal parts of rectified spirits and water; I added then to them a few drops of my chalybeate water; each struck a deep black colour equal to that found by the experiments made on opium that had not been exposed to heat. To two patients I gave three grains each of this fermented opium; the dose began to operate on one in thirty-five minutes, and produced a nausea, headach, vertigo, and most of the other symptoms which commonly follow

such a quantity of opium. The operation of the opium did not appear so soon in the other patient as common; but at length produced symptoms similar to those just mentioned. From these experiments I am induced to believe, that the opinions of those who attempt to prove that opium is deprived of its dangerous properties by fermentation, must be erroneously founded. If the active properties of opium depend upon its essential oil (which I conceive we are led to believe from the experiments in a former part of this work), it clearly follows, that the moderate degree of heat necessary to produce fermentation, is by no means sufficient to deprive it of this property. I was led to use the fixed air in these experiments with a view to discover its effects in the process of fermentation, and also to see whether it produced any change in the astringency of the opium. From the circumstances related,

lated, it will appear very evident, that the fixed air hastened the fermentation; but no difference could be discovered in the astringency of the opium, as that appeared to be equally great in each.



# PREPARATIONS

O F

O P I U M.

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**T**HOUGH many of the preparations of opium that were introduced by the most ancient physicians are now thrown aside as totally inefficacious; yet we find, that, led away either by blind prejudices or an uncommon attachment to former customs, some are still retained, which will be found, by minute investigation, to be useless--A variety of preparations have been introduced with a view to deprive the

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opium

opium of its dangerous properties, and also to render it palatable. The latter may perhaps be useful, but the former seems to merit little attention.

OPIMUM COLATUM, vel EXTRACTUM  
THEBAICUM.

THIS preparation is highly recommended by the London Dispensatory, as the one in which we have opium in its purest state. I trust, however, I have proved by EXPER. XXII. and XXIII. that it does not possess these advantages. I not only found that the strained opium of the shops contained a considerable quantity of inactive matter, but also that its action was much injured by the great degree of heat used in the process for preparing it.—These reasons lead me to believe, that it would be advisable to throw aside this formula

alto-

altogether, and adopt the one recommended in EXPER. XXIII.

LAUDANUM LIQUIDUM, vel TINCTURA  
THEBAICA.

THIS preparation, highly recommended by the London Dispensatory, perhaps merits as much attention as any other; as the menstruum used not only acts powerfully upon the opium, but renders it palatable: but even this elegant preparation has some inconveniences attending it; as the opium, with which it is ordered to be made, is found to contain much inactive matter, there can be no real certainty in the dose. The Edinburgh Pharmacopœia has made some improvements in this formula, by increasing the quantity of opium. When opium is to be administered in a fluid form, perhaps this will answer better than any other.

## ELIXIR PAREGORICUM.

THE Edinburgh and London formulæ here differ somewhat from each other. The London recommends rectified spirits of wine as the menstruum, while the Edinburgh advises the vinous spirit of sal ammon: this perhaps may be the most powerful menstruum. The Edinburgh formula has also increased the quantity of the opium. From this last improvement I apprehend the greatest advantages must arise: As the opium in this preparation is the principal ingredient on which we place our dependence, it is necessary to administer it in such a quantity as to enable it to produce its good effects. This preparation is said to be useful, by allaying the tickling which provokes frequent coughing; and is supposed also to render respiration easy. The opium is said to procure

a temporary relief from the symptoms, while the other ingredients tend to remove the cause, and prevent their return.

PILULÆ SAPONACEÆ. (L.)

THIS is a preparation which I am led to believe may be productive of some disagreeable consequences: Though the essence of lemons used may make it agreeable to the stomach, yet if the soap which the pills contain should meet with an acid in the stomach, which must often happen, it would be immediately decomposed, and perhaps produce disagreeable effects.

PILULÆ È STYRACE. (L.)

THIS preparation seems to have been intended to prevent the opium from acting speedily: The storax used, which is a resinous substance, being difficult of solution,



may perhaps answer this purpose; but whether any benefits are ever to be expected from this formula, seems doubtful.

PILULÆ THEBAICÆ, vulgo PACIFICÆ. (E.)

THE Jamaica pepper, recommended as one of the ingredients in this formula, may perhaps be useful, by rendering the opium palatable: no medicinal virtues can be expected from any of the ingredients except the opium, as their quantities are too small to enable them to produce any effects.

PULVIS è BOLO compositus cum OPIO.

IF any good effects were ever observed to follow the use of this preparation, I am induced to think that the opium is intitled to no part of the merit; because its quantity

tity is so very small, when compared with the other ingredients, as to render it incapable of producing any effects from its operation. It is ordered to be given in fluxes, and other diseases where astringents are required.

SPECIES è SCORDIO cum OPIO. (L.)

THIS preparation is stuffed with a number of ingredients, among which opium is introduced, but in so small a quantity, that we are denied the liberty of saying any salutary effects arise from its operation. We are told by some, that long experience has now established the utility of this formula: if this opinion be just, I am inclined to think, that it is the operation of the other ingredients, and not that of opium, which renders it valuable.

## PULVIS è SUCCINO compositus. (L.)

MANY of the ingredients formerly contained in this formula have been lately thrown aside as totally superfluous; and I am induced to think, if this reform had been more extensive, the preparation would then have been rendered as elegant, and clearly more valuable, as it even now contains many ingredients which can possess no medicinal virtues. Two scruples of this composition contain only one grain of opium. It is retained as an elegant astringent.

ELECTARIUM è SCORDIO vulgo DIA-  
SCORDIUM.

THE Edinburgh Pharmacopœia has ordered this formula to be changed, and introduced one in its place under the name  
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of Electarium Japonicum, which seems much more elegant and valuable; but even in this the quantity of opium is very small, ten scruples of the electuary only containing one grain of the opium. This is considered as a moderately warm astringent and opiate.

#### CONFECTIO PAULINA. (L.)

IN this the proportion of opium is one grain to thirty-two of the other ingredients. It is used as a warm opiate medicine. If this preparation has been found useful, perhaps the opium is intitled to the smallest share of the merit, as its quantity is small, and all the other ingredients of a warm and active nature.

PHILONIUM, MITHRIDATIUM, et  
THERIACA. (L.)

THESE three, together with the two last formulæ, are the only compositions now remaining of what have been called the *Officinal Capitals*. It is not a little wonderful, that the physicians of the present day should suffer themselves to be led so far by their attachments to ancient customs, as still to retain among them the above formulæ. We find that the ancients introduced these as antidotes to secure them against the danger of poisons; but when we are told by the light of the present day, that these poisons of the ancients, as well as their antidotes, were only the offsprings of fancy, shall we even then suffer blind prejudice to lead us on to adhere to the same custom? Though these formulæ contain many very active remedies,  
yet



yet they are so curiously and promiscuously intermixed, and the operations of many of them so very different, that we cannot expect much benefit from any of them; and clearly the smallest must be attributed to the opium.

#### LINIMENTUM ANODYNUM.

THIS liniment, composed of camphor and opium, in very considerable quantities, is said to be an anodyne and discutient. It is recommended highly to allay pains in strained limbs, and many other topical affections.

#### TROCHISCI BECHICI cum OPIO.

THESE troches are recommended as very efficacious in tickling coughs; they are thought to allay the irritation of the fauces, which tends much to render the cough  
trouble-

troublesome \*. Although most of the formulæ I have mentioned are still employed, and much respected by some physicians, yet I am led to think, that we may reap most of the advantages of opium from a preparation of the following nature:

℞ opii pur. gr. j.

Extract. Glycyrrh. grs. ij.

M. fiat Pil.

When the opium is given in this manner, it seldom proves disagreeable to the stomach; and the liquorice with which it is mixed renders the pill easily soluble: Another very singular advantage in this preparation

\* Opium is often united and administered with other remedies, to prevent their operation on the intestines; as with bark, mercury, &c.

paration is, that we may ever be certain of the quantity of opium given \*.

\* Dr Duncan recommends the following formula:

℞ Opii ʒi.

Mic. pan. ʒʒss.

Syr. simp. q. s. fiat massa divid. in pilulas granorum quinque.

Though this appears to be a very convenient and useful formula, still I must hope to be pardoned when I say that some inconveniences may attend it: It appears to me, that the bread with which the opium is ordered to be mixed will be apt to lose its moisture; and thus becoming hard and dry, must be dissolved with difficulty; for this reason I took the liberty to recommend the extract of liquorice, which retains its moisture, and promotes the solubility of the opium.

E X P E-

# EXPERIMENTS

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## LIVING SUBJECTS

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### EXPERIMENT I.

**I** DISSOLVED ten grains of the common opium of the shops in one ounce of water, and then poured a considerable quantity of the solution into the eyes of three puppies three weeks old; the muscles of the eyes were soon thrown into motion, and the puppies expressed much pain by their actions. As soon as they were quiet,

the eyes of each were attentively examined: there appeared a little redness in the tunica conjunctiva of one, which remained visible but a short time; the others were found in a natural state.

## EXPER. II.

SEVERAL drops of the solution used in last Experiment were poured into my own eye; the muscles were instantly thrown into a violent motion, and I felt a most excruciating pain for seven minutes, which was followed by a copious discharge of tears: as soon as the eye became quiet, I had it examined by my friend\*, who witnessed the Experiment; and he conceived that an unusual degree of redness was produced; but this was slight, and soon disappeared. From the violence of the pain which the solution caused, I feared some  
injury

\* Dr Ramsay from Virginia.



injury would follow; but these apprehensions were groundless.

### EXPER. III.

ONE drachm of opium was dissolved in one ounce of water, and some of the solution thrown into the eyes of the three puppies mentioned in Experiment I. The muscles of each were thrown into a violent motion, which continued for seven minutes: as soon as they were quiet, I examined the eyes of each, and discovered some little redness in the whole; but this was slighter than I expected from the violence of the actions produced by the solution. A large quantity of fluid was observed to flow from their eyes after the motions ceased.

EXPER.

## E X P E R. IV.

A QUANTITY of the solution last used was placed near a stove where the heat was eighty-five degrees by thermometer; I then poured several drops of it into the eye of a dog—The muscles were instantly thrown into a motion, which appeared to be much more violent than that produced by the solution in a cold state, and continued much longer: when the dog became quiet, I examined the eye, and found a very considerable degree of redness in the tunica conjunctiva, which remained visible some considerable time, attended with a copious discharge of fluid.

## E X P E R. V.

TWENTY drops of this warm solution were poured into one of the eyes of a rab-

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bit, and into the other the same quantity of the solution in a cold state; the eye into which the warm solution was poured became much sooner disturbed than the other, the action was more violent, and continued much longer. When they were quiet, I examined each; and found the one to which the warm solution had been applied considerably inflamed; the other eye appeared much more red than natural. I endeavoured to discover the length of time the redness might continue in each; and found, that that produced by the warm solution disappeared in about half an hour, the other only remained visible fifteen minutes. From this it appears, that a moderate degree of heat added to opium increases its action considerably, and causes its effects to be produced much sooner than when in a cold state. To satisfy myself fully, whether this difference arose from the heat increasing the active properties

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ties of opium or from the warmth of the solution only, I applied the same degree of heat to some water, and then poured a considerable quantity of it into the eye of a dog; the animal appeared at first a little uneasy, but this was momentary: when the eye was examined, no preternatural redness could be seen.

## E X P E R. VI.

I LAID bare the fibres of the glutei muscles of a rabbit, and then poured on them a considerable quantity of the strong solution \* in a cold state; the greatest attention was given, but no motion could be discovered in the part. This experiment was then repeated on another rabbit; but the result was ever the same. I

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\* The strong solution is, one drachm of opium to one ounce of water.



then laid bare the muscles of the thorax and abdomen, and applied a considerable quantity of the same solution: the event proved the same as before; no change whatever could be discovered.

#### EXPER. VII.

HAVING laid bare the crural artery of a rabbit, I divided it, when the blood instantly flew out with considerable velocity; some of my strong solution was then applied to the divided artery, the ends of which in a short space of time contracted, and the hemorrhagy ceased. The same experiment was performed on the brachial artery with like success.

#### EXPER. VIII.

I OPENED the thorax of a rabbit, and by dissection placed the heart in full view;  
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the aorta was then divided, and the animal bled till it expired. After the heart had remained motionless ten minutes, and every appearance of life had ceased for the same length of time, I poured on the heart a quantity of my strong solution; it was instantly thrown into motion, which continued two minutes; I then added more of the solution, and the action was again renewed. By thus repeating my applications, the motions of the heart were supported more than ten minutes. It occurred to me, after I had made this experiment, that water applied in the same manner would have similar effects. To determine this, I put another rabbit in the same situation, and then applied a quantity of cold water to his heart. As soon as the first application was made, it was roused into action, but only moved five times; the second application only produced one

feeble stroke, and no motion could be raised afterward by the same methods.

### EXPER. IX.

AFTER making a small opening into the abdomen of a rabbit, a quantity of my strong solution was thrown in, and the wound closed to prevent the admission of air. The animal remained in this situation half an hour, when I opened the part, examined and found the external coats of the intestines and neighbouring parts much inflamed.

### EXPER. X.

I OPENED the thorax of a rabbit, and, without doing any injury to the large blood-vessels, placed the heart in view. A quantity of my strong solution was then applied to it, which so accelerated the mo-

tions as to render it impossible to number them : By renewing the application, these were continued for some considerable time. The surface of the heart now appeared uncommonly red, and continued so some time.

## E X P E R. XI.

I OPENED two rabbits, and, without doing any injury to the large blood-vessels, placed the hearts of each in view. A quantity of Volat. Alkali was then applied to the heart of one, and to the other some of my strong solution. Though the greatest attention was given to the motions of each by myself and friend \*, no difference could be discovered. By renewing the applications they were continued in action some considerable time : at length

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\* Dr Ramfay, who witnessed most of my experiments on living subjects.

the one to which the volatile alkali had been applied ceased to move; in half a minute after, the actions of the other ended; and neither could be again roused by any other application.

## EXPER. XII.

I THREW a quantity of my strong solution into the rectum of a rabbit, and confined the animal so as to have it retained half an hour: the intestine was then opened, and evident marks of inflammation appeared in all those parts to which the solution had been applied.

## EXPER. XIII.

I MADE one drachm of pulverised opium into the form of a cataplasm, and after rubbing the inner part of a man's arm well with a flannel cloth, applied it, where it  
re-



remained twenty-four hours: at the end of this time I visited the man, and inquired whether he had been unusually affected by the application: He answered repeatedly in the negative. The part to which the opium had been applied, was now examined; but no marks of inflammation could be discovered.

## E X P E R. XIV.

FOUR drachms of pulverised opium were now made into a cataplasm, and applied to the inner part of a man's thigh which had been rubbed with flannel. It remained on the part twenty-four hours; when I removed it, and inquired whether the patient had discovered any effects from the application; he assured me that the opium had produced no sensible operation. From these experiments I am led to believe, that the common received opinion respecting

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ing the operation of opium, externally applied, must be erroneously founded; and though this opinion has been given to the world by some very eminent men, still I feel myself bound to contradict it from the result of these experiments. I am led also to believe, that opium applied to any part protected by the common coverings of the body, can never produce any sensible effects, unless the sensibility of the part is much increased by inflammation, as in rheumatism and gout.

#### EXPER. XV.

I LAID bare the abdominal muscles of a dog, and applied to the part six drachms of opium in the form of a cataplasm. In about one hour and a half the animal began to be affected, and at the end of two hours was completely convulsed. He remained in this situation some considerable time;

time; and when the motions were about to cease, the dog was compelled to swallow one ounce of opium dissolved in water: in a short space of time his convulsions returned in a much more violent degree than before, and in less than two hours he died. I immediately opened his stomach, and examined the coats very attentively, but could not discover any marks of inflammation.

### EXPER. XVI.

I DISSOLVED five grains of common opium in one ounce of water, and then with a syringe threw into the urethra of a man a quantity of this solution; but it neither produced any pain or inflammation in the part.

EXPER.

## E X P E R. XVII.

I DISSOLVED one drachm of opium in one ounce of water, and threw into the urethra of the same man a considerable quantity of this solution; he soon began to complain of a burning heat in the part, which he said was severe. In two hours after this I examined the penis, and found many marks of inflammation about the orifice; this remained visible but a short space of time, and was not followed by any discharge.

## E X P E R. XVIII.

I MADE some of the solution last used moderately warm, and threw a quantity of it into my own urethra; it soon began to operate, and gave me very severe pain, which lasted five minutes: the penis was

examined very attentively, but no symptoms of inflammation could be discovered externally. In half an hour after the experiment was made I attempted to pass my urine, and felt some symptoms of heat in the urethra, but these were not severe.

## E X P E R. XIX.

I DISSOLVED one drachm and a half of opium in one ounce of water; and after adding to it ninety degrees of heat by thermometer, a small quantity was thrown into the urethra of a man fifty years of age: in a little time he began to complain of a very severe pain, which continued several minutes, attended with a great degree of heat. Ten minutes after this I examined his penis, and found a considerable redness round the orifice of the urethra. He was now desired to pass a small quantity of urine; which he effected, but not without much pain;



pain; as from his own account every symptom had taken place which characterises dysuria.

### EXPER. XX.

A QUANTITY of the solution last used was thrown into the vagina of a bitch; in a little time the animal began to be violently agitated, and continued so several minutes. As soon as she was perfectly quiet, I examined the parts, and found that the labia were increased considerably in size, and the redness of the internal parts appeared much greater than natural. I was extremely anxious to know whether any preternatural discharge from the vagina would follow this experiment, but was disappointed by an unexpected accident.

EXPER.



## E X P E R. XXI.

I MIXED together a quantity of caustic and strong solution of opium; it was then applied to a piece of dead flesh: the caustic began immediately to act, and destroyed the same quantity of flesh as if no opium had been united with it: this was discovered by applying to some of the same flesh the pure caustic alone. This experiment was instituted with a view to discover the propriety of the present prevailing opinion, which is, that opium deprives the caustic of its power to act on flesh. From the result of this experiment, I am justified in saying, that this generally received opinion must be fallacious; and, like many others now entertained, which are said to be the result of experiment, could only have received birth in the closet. It is well known that opium, if applied in considerable quantity to a part de-

deprived of its common coverings, will destroy its sensibility by acting on the nerves, and consequently lessen the pain arising from the operation of caustic.

### EXPER. XXII.

Six grains of the purest resin of opium were concealed in a piece of bread, and then given to a dog; his actions were attended to for six hours, but no changes could be discovered in him. I then had him killed, and laid open the stomach, in which the pill was found; the surface was soft, and appeared at first view to have been operated upon. The pill was dried, accurately weighed, and found to have lost one grain.

### EXPER. XXIII.

I FORCED open the mouth of a rabbit

and then introduced ten grains of the pure resin of opium in form of a pill; a quantity of water was poured into his mouth, which conveyed the pill into the stomach. Finding that the animal remained undisturbed for six hours, I had it killed, and opened the stomach, in which the pill was found; it was then dried, weighed, and found to have lost nothing in quantity.

These experiments were instituted with a view to discover certainly, whether the gastric fluid has any power by which it can dissolve pure resinous substances; from the result of these, we are authorised to say that it has no such power.

#### EXPER. XXIV.

I mixed intimately together five grains of pure resin of opium and ten grains of the extract of liquorice; this was forced

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into

into the stomach of a rabbit in form of a pill; in less than six hours the animal seemed much affected: it was then killed, the stomach opened, and only one grain of the pill remained undissolved. From this experiment it appears very evident, that the extract of liquorice, when intimately combined with a pure resinous substance, renders it soluble in the stomach.

#### EXPER. XXV.

To a healthy man thirty years of age, I gave two grains of the purest resin of opium dissolved in alcohol. When the dose was given, his pulse measured sixty strokes in a minute: in half an hour he complained of an unusual heat about his stomach, attended with some affection in his head. His pulse increased now twelve strokes in frequency, and remained so five minutes; after



after which it fell down to fifty-five, and became remarkably full and strong: headach, vertigo, and drowfiness, now came on, which continued severe two hours. No thirst or increased perspiration followed; the man continued coſtive forty-eight hours.

## E X P E R. XXVI.

FOUR days after the laſt experiment, I gave the ſame man three grains of pure reſin diſſolved in alcohol. In half an hour it began to operate, by warming his ſtomach and heart, as he obſerved, and then producing vertigo: he then obſerved that he felt as if he had taken too much whiſky. His pulſe had now increaſed three ſtrokes in frequency; but in fifteen minutes fell fourteen, and became very full and ſtrong; he complained of much languor and weakneſs for ſeveral hours after, attended with a loſs of appetite.



## E X P E R. XXVII.

To a healthy young man I gave four grains of the gummy part of opium dissolved in water; in about forty minutes he began to complain of a great drowsiness and disposition to sleep, attended with a depression of spirits. I remained with him one hour and a half; during which time no symptoms, except the drowsiness, appeared; being compelled to leave the patient, he was placed under the direction of a very intelligent man: after several hours had elapsed I returned, and received the following account: “As the patient  
“ was sitting in a chair, he was taken with  
“ a violent sickness at his stomach and confusion in his head, but no vomiting followed: in a few minutes he fainted, and  
“ fell on the floor, where he remained motionless some time.” The man under whose protection I left him, had his body  
4 and

and extremities well rubbed with flannel; by which he recovered, and was put to bed; but informed me that he could not sleep, as he was disturbed through the night by frightful dreams. His urine was considerably increased in quantity; and his thirst, from his own account, was insatiable. This experiment must convince us of the fallacy on which an opinion now prevailing is founded, viz. that the gummy part of opium, in a pure state, possesses none of those dangerous properties which are found in the resin.

## E X P E R. XXVIII.

To a healthy young female I gave three grains of the gummy part of opium dissolved in water; in one hour she began to complain of a violent sickness at her stomach, headach, and drowsiness: her pulse in ten minutes after this fell fifteen strokes

in a minute, and became very full and strong: she remained in this situation one hour and a half, when all the symptoms disappeared except her headach. Her appetite was so much injured, that she could not take food for twenty-four hours.

### EXPER. XXIX.

I GOT two patients into the same room, the one a man thirty years of age, and the other a female about twenty-five. To the man I gave five grains of the resin of opium dissolved in alcohol, and to the woman as much of the gum dissolved in water. In half an hour the dose began to operate on the man, and produced a violent sickness at his stomach, vertigo, and head-ach: the sickness at his stomach did not produce a vomiting, but the other symptoms increased to so violent a degree as to cause a kind of raving; from his own

account, he felt every symptom of drunkenness: his pulse at first rose six strokes in frequency; but in fifteen minutes fell twelve, and became very full and strong. These symptoms were followed by a great thirst and copious discharge of urine. It was near one hour after the woman took her dose before it began to operate: the first symptoms she complained of were a nausea and great degree of drowsiness; the latter increased to so great a degree that she was unable to sit up: her pulse fell in a little time fifteen strokes, and became extremely full; soon after getting on her bed, she was affected with violent convulsions, which were relieved by the operation of a few grains of Ipecacuanha and sixty drops of æther: she continued to be affected for two days after, and her appetite was much impaired. These experiments were instituted with a view to discover, whether there was any difference



in the operation of the resinous and gummy parts of opium : from the result we must conclude, that the resin is possessed of properties much more active than the gum.

### EXPER. XXX.

To a woman fifty years of age, who had been a little accustomed to use opium, I gave six grains of the common kind found in the shops, in form of pill; in fifty minutes after she had taken the dose her stomach became affected, and a violent vertigo soon followed: from her own account she now felt every symptom of drunkenness; she confessed that she had been a few days before intoxicated by the free use of whisky; and said, that the operation of the opium was similar to that of the spirits. When the opium first began to operate, her pulse was very irregular; in fifteen minutes after, it fell  
fourteen



fourteen strokes; and though very feeble before the operation of the dose, became now extremely full: after most of the violent symptoms ceased, she had repeated inclinations to make urine, which was often discharged in large quantities: her appetite continued bad for two days, attended with costiveness and general debility.

## E X P E R. XXXI.

SOME months before I engaged in these experiments, my friend Dr James Ramsay from Virginia, anxious to know the effects of opium, made the following experiment on himself, which he communicated to me.

“ Finding myself one night at eleven  
“ more disposed to sleep than usual, I  
“ determined to try the effects of opium,  
“ and took immediately thirty drops of the  
“ Theb.

“ Theb. Tincture. The dose soon began to  
“ operate, and produced such enlivening  
“ effects as to enable me to prosecute the  
“ study in which I was then engaged. In  
“ this cheerful situation I remained till one  
“ o’clock in the morning, when I found  
“ a violent drowsiness coming on, which  
“ in a short space of time increased to such  
“ a degree, as to render it difficult for me  
“ to avoid falling to sleep. I then took  
“ between ninety and one hundred drops  
“ of the same Theb. Tinct. which soon  
“ roused me from my drowsiness, and in-  
“ vited me once more to engage in my  
“ business. This disposition continued but  
“ a short time: I soon found myself so  
“ exhilarated, as to grow careless of my  
“ occupation, and rather inclined to in-  
“ dulse in an excess of gaiety; which was  
“ gratified for some time by ridiculous  
“ excesses of dancing, singing, &c. The  
“ powers of my mind still remained so  
“ perfect,

“ perfect, as to enable me to attend to my  
“ conduct, and to examine the state of my  
“ pulse, which was strong and full; but  
“ not having a proper watch, could not  
“ ascertain its frequency. These symp-  
“ toms soon increased to so violent a de-  
“ gree as to alarm me; the pulsations of  
“ the temporal arteries became uncom-  
“ monly strong, and every object appeared  
“ multiplied and covered with a mist.  
“ At this moment I arose from my seat;  
“ but soon found myself unable to walk,  
“ as my legs felt much lighter than usual:  
“ with much difficulty I reached the  
“ window and hoisted it, expecting to  
“ be relieved by the fresh air; but in  
“ this was disappointed, as the vertigo  
“ seemed much increased by it. I now  
“ with the utmost difficulty undressed my-  
“ self and got to bed, where I remained  
“ almost motionless, being unable to move  
“ my limbs: my imagination was so di-  
“ stressed

“stressed by the appearances of horrid  
“images, that I could not close my eyes  
“till seven, when I fell into an interrupted  
“slumber. At ten I rose from my bed;  
“and finding myself much debilitated,  
“and inclined to vomit, took thirty drops  
“more of the Theb. Tinct. which so far  
“removed my complaints as to enable me  
“to dress: my appetite was so much in-  
“jured, that I could eat no breakfast, drank  
“only a dish of tea, and then went out  
“to pursue my daily occupations. After  
“exposing myself for some little time,  
“grew sick at my stomach, and threw up  
“a quantity of bilious matter. About  
“twelve my appetite returned, when I  
“eat a salt herring, and drank a bottle of  
“porter. From this time continued well  
“till three in the evening, when the sick-  
“ness at my stomach returned, which  
“was removed by a glass of rum and  
“water. At seven I went to the play-  
“house,



“house, where I remained only a short  
“space of time, the heat being so violent  
“as to cause a return of all the dangerous  
“symptoms: was then carried to my  
“lodgings, where I was seized with con-  
“vulsions; which my physician informed  
“me were relieved by warm applications  
“to my extremities and a dose of musk.”

## E X P E R. XXXII.

To an healthy young man I gave two ounces of the common vegetable acid; in fifteen minutes after, he took eighty drops of Theb. Tinct. I remained with him two hours. Just before my departure he complained of a little nausea and headach: these symptoms, as he informed me, continued but a short space of time; and when they were removed, he felt himself as usual, except a little sickness about his stomach. I attended very particularly to  
his



his pulse, but could discover no change in it.

### EXPER. XXXIII.

I GAVE a boy, twelve years of age, one ounce of common vinegar, and in fifteen minutes after forty drops of Theb. Tinct. In half an hour it produced a severe sickness at his stomach, but no vomiting; his head now began to be a little affected, but did not continue so long; his pulse remained steady, except when the nausea appeared; at that moment was irregular. These symptoms soon went off, and the boy was restored to his usual situation. Experiments similar to these were made on dogs and rabbits; the opium was seldom found to have much effect, if an acid had been previously given.

From experiments like these must have arisen the opinion which led some to believe,

lieve, that acids, administered after a large dose of opium, though it had operated, would correct the dangerous properties of that remedy: to this I cannot subscribe; for to me it appears evident, that the acid can only have the power of rendering the nerves of the stomach, upon which it acts as well as the opium, insensible to the operation of that remedy: this the acid cannot effect after the opium has operated. To satisfy myself fully on this subject, I made several experiments on frogs and dogs; and found, that the acid, if given after the opium began to operate, had not the smallest power of correcting its dangerous properties\*.

## E X P E R.

\* Dr Webster, in his Syllabus, has the following observation: " Acids render the stomach less capable of being acted upon by other matters, as spirits, alc, &c." The Doctor in his lectures extends this observation, by saying, that the actions of hemlock, opium, and ipecac. are moderated much by the addition of an acid."

## E X P E R. XXXIV.

To four men, whose ages and constitutions appeared to be nearly similar, I gave the following quantities and forms of opium, viz. to the first, I gave two grains of the purest resin of opium dissolved in alcohol; to the second, the same quantity of pure gum dissolved in water; to the third, forty drops of Theb. Tinct. and to the fourth, the same quantity of Theb. Tinct. heated to the degree of ninety by thermometer. The resin began to operate in twenty-eight minutes, and produced the common symptoms. The gum began to operate in fifty-five minutes; the Theb. Tinct. in a cold state, in thirty-eight minutes; and that to which the heat had been applied, in thirty-two minutes. These experiments were repeated the day following on the same persons; and though I  
must

must confess that they did not agree exactly with the first; yet the difference was small, and the resin dissolved in alcohol ever discovered its action first.

As these experiments were instituted with a view only to discover the time in which the different forms of the opium would operate, I did not suppose it necessary to attend to the different symptoms, and particularly as experiments for this purpose have been already related.

If we are at liberty to judge from these experiments, it must appear evident, that the resinous part of opium, when dissolved in alcohol, has the power of producing its action much sooner than the other preparations of that remedy. This must either lead us to suppose that the resin possesses most of the active parts of the opium; or that its menstruum, alcohol, assists in producing

I



ducing its speedy operation. It seems evident also, that by the addition of heat, the Theb. Tinct. is enabled to produce its effects much sooner than in the common form.

These experiments may perhaps at first view appear better calculated to please the curious mind than to afford real utility; but I am led to believe, that when they are attentively investigated, we shall easily discover their benefits. It is well known to all physicians, that many diseases occur in which it is necessary to procure the operation of an opiate as soon as possible : It is in these cases, then, that the advantages of these experiments will discover themselves.

Such are the experiments which I have instituted for ascertaining the effects and the virtues of opium. It might be expected,



ted, that, after these, I should proceed to give my opinion concerning the operation of this excellent remedy ; but many reasons dissuade me from entering at all into a discussion of this point. This subject has of late occupied the attention of most medical men ; and various opinions with regard to it have been brought forth and supported by writers of the highest eminence. The author of this Treatise is too sensible of his own weakness and insufficiency to obtrude upon the world any speculations supported merely by his slender authority ; and especially in a subject upon which so much has been said, that to say more would perhaps only tend to render more perplexed what of itself is already sufficiently intricate, and to involve in greater darkness an inquiry which clouds of authors have already obscured. The reader of this Treatise, it is therefore hoped, will pardon the Author for not en-

tering into a subject thus darkened by the shades of controversy; and where both might thus bewilder themselves, and be lost in the surrounding gloom.

Instead, therefore, of venturing upon an inquiry so hazardous, so difficult, and so full of conjecture; instead of committing himself in a contest with any writer by broaching any general theory whatever; the Author has thought it safer, and by far the most eligible mode, to detail with accuracy and precision those experiments, which he made with the greatest care, and from which every impartial man may deduce such conclusions as the experiments themselves shall appear to warrant. He has produced facts for which he can vouch; the result of these facts he leaves with a discerning public. Their real value and consequence will be the better perceived, from their being naked and destitute of all  
arti-

artificial gloss, of all adventitious decoration. And the highest wish of the Author will be gratified, if his industry shall have furnished the materials upon which the ingenuity of other men may erect what he himself is cautious of rearing.

I 3

O N

ON THE  
USES OF  
OPIUM.

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AS the operation of opium has for some time past been the subject of much dispute, the attention of most medical men has been naturally called forth to this remedy; hence it has been recommended in so many different diseases, that to enumerate these would exceed the limits of this Treatise. Such, therefore, alone will be  
men-

mentioned as seem most particularly to require this remedy. But before these are detailed, it will be proper to introduce the opinions of the ancients respecting the operation of opium, and the forms in which they used it: as they had no favourite theories to support, we shall find their conclusions deduced from undoubted facts.

In Chardin's travels through Persia, we find the following observations: " The  
" free use of opium among the Persians  
" appears to have been introduced to al-  
" lay the uneasiness and troubles of old  
" men in great places, who were forbid  
" the use of wine by Mahomet. They  
" have several preparations of the poppy  
" which they use for this purpose; the  
" first is the juice of the poppy itself, which  
" they use in form of a pill of the bigness  
" of a pin's head at first, and then gra-  
I 4 dually



“ dually increase it to the size of a pea ;  
“ in one hour’s time they begin to feel  
“ its effects. The Persians say it enter-  
“ tains their fancies with pleasant visions,  
“ and a kind of rapture ; they very soon  
“ grow merry, then burst into a laugh,  
“ which continues till they die away in a  
“ swoon. It is found by those who have  
“ a disposition for jesting, to increase that  
“ extremely. After the operation of this  
“ remedy, the body grows cold, pensive,  
“ and heavy ; in this dull and indolent  
“ situation it remains till the dose is re-  
“ peated. Those of the Persians who are  
“ accustomed to use this remedy cannot  
“ live without it ; the want of it produces  
“ depression of spirits, and a languor and  
“ debility are instantly discovered in the  
“ countenance. The Turks say they can-  
“ not live without opium, unless wine is  
“ given them in its place ; and even then  
“ they are not content, as they say that

wine

“ wine does not operate so powerfully on  
“ them as opium.”

It is said by some writers\*, that among many of the Turks opium is used to the quantity of ten drachms in the day. Kerr observes, that it is the custom of the Chinese to smoke opium in their pipes in the place of tobacco; and this they do because it produces a liveliness in them. Chardin mentions the following circumstances:  
“ When a Persian finds himself in a distressed situation, he has recourse to a piece of opium as big as his thumb, and immediately after taking this he drinks a glass of vinegar; this throws him into a fit of laughter and every extravagancy of mirth, which terminates in death: hence this common saying among them, *When you are wearied with life, have recourse to opium and vinegar, and then you die*

\* Garcias.

“ *die merrily.* There is a decoction which  
“ is made of the shells and seeds of the  
“ poppy, this the Persians call Locquenor;  
“ they sell it publicly in all their cities as  
“ they do coffee: it is curious to observe  
“ the countenances of those who use this  
“ decoction, before its operation, and when  
“ its effects have taken place. When they  
“ come into the decoction-house, they are  
“ dull, pale, and languid; but as soon as  
“ the remedy begins to operate, they are  
“ quite changed: they run into all the ex-  
“ travagancies of mirth and laughter, and  
“ such an uproar is produced, that it would  
“ be more proper to give it the name of  
“ the Mad-house than Decoction-shop.  
“ From these effects of opium the Persians  
“ call it a Rapture, and maintain that there  
“ is a supernatural and divine impulse in  
“ that frame of mind which opium pro-  
“ duces.”

It is observed in the history of Egypt, that the bakers in that country sprinkle the seeds of poppies upon their bread, because it is a provocative to sleep; and the lower class of people eat the seeds. Russell, in his History of Aleppo, has given the following remarks on the use of opium among the Turks. “Opium is not so highly esteemed by the inhabitants of Aleppo as those of Constantinople and some other places; nor could I ever find it so generally taken in Turkey as is commonly apprehended, it being chiefly confined to the debauchees. They who take it in large quantities are called Te-reakys, from the term Theriaca Andromachi, which perhaps may countenance a conjecture, that this was the original form in which they used it: At present, they not only use it in that form, but have various other electuaries or confectious wherein it is mixed with aromatics.



“tics. Some few use it pure; and the  
“greatest quantity I ever knew taken was  
“three drachms in twenty-four hours.  
“The immediate effect that I observed it  
“to have upon such as were addicted to  
“its use, was, that their spirits were exhi-  
“larated; and from a dozing depressed  
“state, they became active and alert. The  
“consequences of a long use of it are,  
“that they soon look old and emaciated,  
“like such as, in Europe, have ruined their  
“constitutions by hard drinking.”

How the benefits of opium were discovered in certain diseases, seems rather difficult to explain: but certain it is, that this remedy has been long since used in intermittent fevers; and some very old writers \* depended wholly on this remedy for a cure. † Many have advised it to be  
given

\* Schulz, Dalberg.

† Paracelsus, Etmuller, and others.



given before the hot stage, or at the moment of its appearance; by which, it is said, the disease has often been removed. ‡ Others are of opinion, that it should be administered one hour before the hot stage; by which the paroxysm is shortened, and the patient freed from pain. From some very late experiments, it is found, that given in the hot stage, opium, as well as volatile alkali, has been observed to allay the heat, thirst, head-ach, and delirium; to induce sweat and sleep; to cure the disease with the less bark, and without leaving abdominal obstructions or dropfy.

THESE effects, perhaps, first suggested its use in typhous fevers; and we find that many physicians of the highest eminence depend now principally on this remedy for a cure. Dr Cullen, in his *Materia Medica*, observes, that opium may be used in  
this

‡ Murray.

this disease as a stimulant, because the *vitalitas* is very low; but when the remissions are distinct, it should then be administered as a sedative.

THE danger which physicians formerly apprehended from the use of this remedy seems now to have vanished; and facts are not wanting to prove, that even the most cautious have of late administered it in the latter stage of typhous fevers, in form of Theb. Tinct. to the quantity of eighty drops, three times in twenty-four hours. The great success attending this practice, has not only rendered it very common, but established opium as one of our most valuable remedies in these diseases.

THE propriety of using opium in the gout, has of late produced some contentions among physicians. Some very eminent men consider this as a disease of a  
1 highly

highly inflammatory nature, and consequently forbid the use of opium: others of equal eminence teach us, that the disease depends upon debility, and can only be removed by stimulant remedies; among which they consider opium the most powerful. Many unequivocal cases have of late been brought, which prove, that the gout has been effectually cured by opium. administered in large doses at the first attack of the disease.

To Sydenham we are indebted for the discovery which proves, that opium is one of our most valuable remedies in the small-pox. This author has very justly observed, that it promotes a free suppuration, increases the salivation, and all other secretions which have been found so very serviceable in this disease: even in those cases where there appeared to be a determination to the brain and delirium, he administered

nistered opium till he had removed the symptoms. When the convulsions before eruption are considerable, portending the confluent or typhous kind, opium and wine are considered as the principal remedies from which we are to expect relief.

THE benefits arising from the use of opium in phthisis pulmonalis, or consumption of the lungs, seems not to be a discovery peculiar to the present age; in the works of Van Swieten we find the following observations: “Opium in this disease is a very excellent remedy, because it alleviates pain and cough, produces sleep, and so refreshes the patient; it also checks the motions of the lungs, and so gives the ulcers an opportunity to heal.” In the writings of Theoph. de Meza, several cases are related, where opium was found to cure this disease in its incipient state. I witnessed a cure of incipient  
2 phthisis



phthisis a few months past, in which opium was given from three to six grains in twenty-four hours, and with the best success.

MANY men \* of the greatest eminence forbid the use of opium in dysentery before evacuants have been administered; because, from its tendency to produce constiveness, it retains the feces, which thus become a source of irritation to the intestines. The practice adopted by most of these is, to evacuate the intestines by a gentle purgative, and then to administer small doses of opium. Some † are of opinion, that opium is most serviceable in this disease combined with Ipecacuanha: Others ‡ advise it to be united with gentle

K purgative

\* Wepfer, Bontius, Sydenham, Pringle, Young, Zimmerman.

† Pringle.

‡ De Haen, Young.



purgatives. An opinion, very different from those just mentioned, is now entertained by physicians high in estimation. They suppose, that dysentery depends on debility, affecting the intestinal canal particularly; and recommend the free use of opium and wine previous to any evacuations: by this practice, we are told, that the tormina and tenesmus, so common to this disease, are quickly removed.

THE use of evacuants previous to that of opium is not so generally recommended in diarrhœa as in dysentery: many physicians administer this remedy freely at the first attack of the disease; and the success attending such a mode of practice can but render it more common. The violence of those symptoms common to cholera forbids the use of evacuants. Hence most physicians in warm climates where this disease is most frequent, have  
found

found it necessary to remove these as speedily as possible: for this purpose, they administer opium in form of Theb. Tinct. from twenty to eighty drops at the first attack of the disease; and the good effects arising from this treatment has now rendered it very general.

OPIUM, combined with laxatives, is generally administered in colic; and is said said to prevent ileus and inflammation by relieving the spasm. In ileus and incarcerated hernia, it is often found to allay the vomiting, the spasms, the pain, and sometimes to diminish the inflammation, and prevent the gangrene of the strangulated gut.

In no disease has opium been more generally recommended than in tetanus; and many physicians\* have depended upon this

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re-

\* Silvester, Clephane.

remedy solely for a cure. Chambers of South Carolina advises the opium to be given in form of clyster, or combined with oil, and applied externally to the part: Hilary directs it to be united with musk; which he says hastens the operation, and has been found to produce the best effects. Some very late and accurate observers\* have found that opium is but little calculated to effect a cure in this dangerous disease. In a work called Practical Remarks on West India Diseases, we find mention is made of a case where thirty ounces of laudanum were given in a short space of time without removing the spasm or pain attending this disease. Mr John Hunter mentions a number of cases in which he gave opium in very considerable quantities both internally and externally, without the smallest benefit. Many cases of tetanus occurred some few months since in  
the

\* Mr John Hunter.

the hospitals at London; for the relief of which, opium was administered in large doses and frequently repeated, but without any good effects. From these circumstances I am led to believe, that physicians have hitherto depended too much on this remedy for a cure; and though I am unable to point out one more efficacious, still it appeared necessary to show the fallacy of our present practice in this disease.

Whether opium is calculated to remove syphilis, has now become a subject of dispute among physicians. Some are of opinion that it acts merely as a palliative, by quieting the symptoms only for a time. There are others \* of great eminence who have endeavoured to establish this as the only remedy necessary to remove this disease; and many unequivocal cases are related, where opium in doses, gradually in-

K 3                      creased

\* Dr Webster.



creased to five grains, three, four, or even six times a-day, has produced a cure. That it is highly beneficial after the free use of mercury, appears very evident from the number of cases related by Mr Grant in the London Medical Journal for 1785.

The danger which many apprehended from the use of opium in ophthalmia, seems now to have been removed by a very valuable publication offered the world by Mr Ware. This writer relates a number of cases where opium, in the form of Theb. Tinct. has given relief after other remedies had been unsuccessfully used.

Some few cases are related where opium has been found very serviceable in dropfy. In Dr Willis's Pharmacopœia Ration. the case of a patient is mentioned, who laboured under ascites attended with ana-



farca, which was removed by Liquid  
Laudanum.

It is found to afford much relief to the  
various spasmodic symptoms of dyspepsia,  
hysteria, hypochondriasis, asthma, &c. &c.

Having now communicated the whole  
of my observations, it only remains to  
apologise for the manner in which I have  
conducted myself in the last part of this  
work. From a first examination the  
Reader may perhaps be led to censure the  
Author for the superficial view he has ta-  
ken of those diseases in which opium is  
used; but when it is considered that li-  
mits were fixed to this Treatise beyond  
which the Author could not go, and that  
to investigate fully and accurately the va-  
rious diseases in which opium is recom-  
mended would require for itself a separate

treatise, he hopes that this omission will be readily excused.

The many marks of friendship and attention which I have received from Dr Duncan during my residence in Edinburgh, call loudly for acknowledgments; and demand that I should seize this my first opportunity to return him thus publicly my most sincere thanks. Nor am I less sensible of the obligations under which I am placed by the services of Dr Webster, from whose private assistance, as well as public lectures, I have derived the greatest benefits.

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